

SALT WATER ^{9 Pam: 8 10}
SWEETNED;

Or, a TRUE
ACCOUNT
OF THE
GREAT ADVANTAGES
Of this NEW
INVENTION
BOTH BY
SEA & LAND:

Together with
A Full and Satisfactory ANSWER to all
Apparent DIFFICULTIES.

ALSO THE
Approbation of the COLLEDGE of PHYSICIANS.
LIKEWISE

A LETTER of the Honourable *Robert Boyle*, to a
Friend upon the same Subject.

Dublin, Printed by *Joseph Ray* at *Colledge-Green*, for *William Norman* (in *Dames-street*) Bookbinder to His Grace the
Duke of Ormond. 1683. *td*

John Popley TO THE *given by Capt. FitzGerald*
 KING'S Most Excellent MAJESTY. *his Gentl^{man}* Sep: 7th 8

SIR,

WHen Mr. Boyle, with my Partners and my self, attended Your Majesty with the Experiment of Reducing Salt Water into Fresh; Your Majesty seem'd so well pleas'd with an Invention of that Universal Benefit, That We cannot but with our Humblest Duty, acknowledge Your Gracious Reception of it; However as Your Great Wisdom and Profound Judgment is not easie to be surpriz'd, and Your Royal Approbation never known to be Your hasty Act of Grace; Your Favour and Patronage was not fully obtain'd, till with the strictest Scrutiny you had first examin'd those Hopes and Probabilities, You vouchsaf'd to encourage in us.

But when, upon further consideration, we had obviated all Difficulties, and salv'd all Objections against this Undertaking, (which we hope will appear in this printed Paper,) Your Majesty was graciously pleas'd to give us Your Approbation, and to order us Your Letters Patents, which Grace and Favour (ought to be, and) is receiv'd by us with the deepest sense of our humble Acknowledgments and Gratitude.

And if the Fruits of Your Royal Grant has not hitherto been deriv'd to us, 'tis partly by some Obstacles we met from the suggestions of a private Person, but more especially by the late Horrid Conspiracy, when, not only our Loyal apprehensions for Your Majesties Danger, diverted our Thoughts from all other Concerns, but likewise we judg'd it a part of our Duty not to be pressing on Your Majesties Goodness, or on Your Ministers of State in so Im-

portant a juncture of Affairs : But having now regain'd Leisure and Freedom after the dissipation of the greatest part of our Fears, We presume a second time to lay these Endeavours at Your Feet, as best Entituled to the Patronage of so great an Undertaking by Your own Subjects, and best able to recommend it to the World by Your Royal Approbation.

This Experiment is in a great degree owing to the Eminent Mr. Boyle, and indeed well worthy so Ingenious a Promoter, being so much the more the Favourite of his happy Genius, as it is Universally useful to Mankind; But whatever Advantages this Country, or indeed the World may receive by it, his whole ambition is bounded in the publick profit, contenting himself with no other Benefit from it, than the satisfaction and pleasure of seeing it accomplish'd by his Friends.

The advantages in regard to Navigation, especially in long Voyages, which are subject (through often Calms, and on several other accounts,) to distress for want of Water, and the benefits to Sea Towns, which are incommodated by Brackish Waters, Together with the Easiness, Cheapness and Wholsomness of this prepared Water, are the principal scope of these ensuing Papers, which are Humbly Dedicated to Your Majesties Perusal, Favour, and further Approbation by,

Your Majesties most Dutiful, and

Obedient Subject,

R. FITZGERALD.

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The fore-going Dedication humbly offered to His Majesty, having discovered the Intention of this Undertaking; it remains now to satisfy all Reasonable Scruples which have been raised concerning the Wholesomeness and Cheapness of Water thus prepared.

The Queries and Answers follow.

Quest. 1. **I***F this Water can be made in sufficient Quantities to serve the Uses of any Ship at Sea?*

Answ. About Ninety Gallons may be prepared in Twenty four Hours by an Instrument of 33 Inches Diameter, which will stand under the Deck of any Ship; and it's computed that less than 3 Quarts is a good Allowance for any man in that time: And if a large Ship, wherein there are many men aboard, should require more Water, then two or more of the Instruments may be had upon Reasonable Terms, and one Man may attend several of them.

Quest. 2. *In case the Operation be by Fire, it may require a Skilful Chymist, or one known in such Operations to be on board every Ship, who will require great Wages?*

Answ. There will be no occasion for any such person, for any Sea-man may be instructed in an Hour or two to prepare this Water.

Quest. 3. *It's probable that the Engine may be frequently out of Order, and being so at Sea, where Artificers and Tools are wanting to repair it, there must necessarily follow want of Water, which will be of ill consequence?*

Answ. This Engine is of such Contrivance, that it's never likely to be out of Order.

Quest.

Quest. *Can this Engine be of use in Stormy weather ?*

Ans. Since a sufficient quantity of Fresh-water may be so easily had by this *Engine*, the Mariners will be careful to make a good Provision of it before-hand ; however 'tis not to be doubted but it will answer the worst Accidents of the greatest Storms, and have its Effect sufficiently in the worst Weather, especially considering that in such desperate Extremities men must be content with smaller Allowances.

Quest. 5. *The Operation being by Fire it may endanger the Ship, and the Smoak be very offensive ?*

Ans. The *Engine* may easily be placed in any Ship without danger of Fire, or offence of Smoak.

Quest. 6. *Will not the Charge of this Instrument and the Materials belonging to it be very great ?*

Ans. It is difficult to make exact Answer to this, but an Instrument of the largest Size, with all the Materials belonging to it, will not amount to above Sixteen Pound at most, and may last many years, and according to the Rates of Ships they may be proportion'd both in Bulk and Price.

Quest. 7. *Will not the Fuel be very Chargeable, and take up much Room in the Ship ?*

Ans. This Operation is caused by so little *Fire*, that it will be very Cheap, and the Provision need not be great, nor the trouble of Stowing it in a Ship.

Quest. 8. *Will not the Ingredients take up much Room, and be very Chargeable ?*

Ans. A Vessel less than a Barrel may contain enough of the Ingredients to carry a Ship to the *Indies* and back again; and the Ingredients for one hundred Gallons of this *Sea-Water* will not amount to above Fourteen Pence at most.

Quest. 9. *Admitting this Preparation of Water may be made, and in sufficient quantities, it may be doubted whether it be Wholesome ?*

Ans. The Famous Lord Bacon having written learnedly
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of this Subject, had not the least thought that the Sea-water after it had been dis-salted, without any Noxious addition, was Unwholesome, and it neither now is, nor ever was really doubted whether it were Wholesome: However, because invidious persons, who are no Well-wishers to Ingenious Designs, may possibly raise Scruples, the Gentlemen who are concerned in this Grant have, purposely to give publick Satisfaction, sent a large quantity of this Water to Doctor *King*, a very ingenious Physician, who is a Member of the *Colledge*, and of the *Royal Society*, who finds:

1. That it is Lighter than most of the Waters about the Town.
2. That it is without Sediment, and Transparent as any other Waters.
3. That it Lathers (as they call it,) with *Wash-ball* or *Soap* better than any other Water, and with less *Soap*.
4. That *Sugar* dissolveth sooner in it, than in other *Water*.
5. That it *Evaporates* sooner than common *Water*.
6. That whereas common *Water* putrifies, and yields a stinking Smell within a few Weeks, this has continued Sweet and unaltered several Months, and may yet do, so much longer, being still in as good condition as it was above four Months ago.
7. That it makes *Jellies* as firm and good as any *Water*.
8. That it boils Pease to Tenderneß, Beef, Mutton, Fish, and all other Meat, without giving it an ill *Taste* or *Colour*.
9. That it has no kind of ill *Taste* in it self, and boils in *Milk* without Curdling.
10. That *Flowers*, *Plants*, and all *Vegetables* grow in it at least as well as any other *Water*. And that small *Animals* live and grow in it.

Several men of great Quality, viz. the Earls of *Shrewsbury*, *Westmorland*, *Mulgrave*, the Lord *Dunbar*, Lord *Lumley*, Lord *Falconbridge*, and Lord *Chumley*, besides several Gentle-
men

men of Quality, Officers of *Sea* and *Physicians* have drunk of this *Water*, without being in the least indispos'd after it; but lest any doubts may remain, after this of the *Salubrity* of the said *Water*, the following Testimonial of these Learned and Eminent *Physicians* is here inserted.

The Approbation of the Colledge of Physicians, and of other Doctors of Physick, Practising in and about London.

WHEREAS we have received an account in a *Gazet* published some Months since, that the Honourable *Robert Fitz Gerald Esq*; hath found out the way and means of reducing *Salt-water* into Fresh, in quantities sufficient to serve Ships at Sea. And forasmuch as some persons may possibly make a doubt, if the said *Water* be wholsome after the Salt is taken out of it. We therefore considering of what general advantage, this useful Experiment may be, having fully inform'd our selves from *Mr. Boyle*, that the said Experiment is made by Fire. And having also seen an account of some Experiments made by some Members of our own Body to declare our Opinion, that we believe the said *Water* is very wholsome, and may be safely us'd. And being further acquainted by the said *Mr. Boyle*, that the very few Ingredients made use of in the said Operation, are fix'd in the Fire, and give no noxious quality to the *Water*; We are therefore of Opinion that the same may be safely us'd, and is at least as Healthy as any other *Water* us'd at Sea. All which we certify (at the Request of the Honourable *Robert Fitz Gerald*.)

Dr. Cox President,
Sir C. Scarborough Knt.
Dr. Daniel Whistler,
Dr. Weatherly,

Dr. William Denton,
Sir T. Millington Knt.
Dr. Walter Needham,
Dr. Thomas Short,

Dr.

Dr. *Thomas Allen*,
 Dr. *Edmond Dickington*,
 Dr. *William Croone*,
 Dr. *Richard Lower*,
 Dr. *John Windebank*,
 Dr. *Daniel Cox*,
 Dr. *James Rupine*,
 Dr. *Charles Conquest*,

Dr. *Edmond King*,
 Dr. *Willoughby*,
 Dr. *Thomas Sydenham*,
 Dr. *Edward Tyson*,
 Dr. *Nehemiah Grew*,
 Dr. *David Abercromby*,
 Dr. *Andrew Creagh*.

Though Physick has always Flourished in this Kingdom, yet in this Age it is in greater perfection than ever; being improv'd both as to the Practical and Speculative part, by the present Fellows of the Famous Colledge of Physicians; who being Men of great Practice and Eminent Learning, cannot but give full satisfaction to all such as inquire concerning the healthfulness of this Water; Their Opinion being in this particular, the more valuable, because it is their own disadvantage; since the Brackish Waters of the Seacoast, and the putrified Waters made use of at Sea, might probably have afforded them a great number of Patients, which may hereafter be lessened by the use of this wholesome Water.

The Benefits and Advantages of Sea Water made Fresh.

Much Stowage will be saved, so that a Ship of 50 or 60 Tun and proportionably of greater Bulk may take in several Tuns of Goods more than they formerly used to carry; which will considerably advance the Trade of all Merchants, and be of vast profit to the Masters or Owners of Ships.

The Charge of Casks is very considerable, especially when bound with Iron, as all Sea-Casks must be; And by means of this Engine, three fourths of that charge will be saved.

The tear and wear of Boats often going from Shipboard, and frequent loss of the Boats and Men in stormy Weather,

and the opportunity of the Sea-mens being Drunk on shoar; by which many fatal Accidents do happen, (by means of having this Water-Engine) will be prevented.

Ships in long Voyages have been forc'd to run many Leagues from their intended course, which much retards their Voyage, and makes them lose Fair Winds, and maintain more Sea-men at Charges of Diet and Wages than they have occasion for; which Inconveniences may be prevented by having Water within themselves.

Ships are often forc'd to leave their Anchors and Cables behind them, by being forced into dangerous Shoars upon account of taking in Fresh Water.

In the *African, East and West India Voyages*, great quantities of Fresh Water are necessary, which the Sea-men are forc'd to put above Deck for want of room, which is great hindrance to a Ships sailing, and much endangers and weakens a Ship in case of Calms, which often happen in the narrow Seas, but especially near the Line, this Instrument will be of vast advantage by affording fresh and wholesom Water, instead of that which is unwholesom and offensive.

Essex, Kent, and all other the Sea-coasts, that want wholesom Water, may be easily and cheaply supplied by this means; as also *Venice, Amsterdam, Rotterdam*, and all other places that lie near the Sea, and either want good, or have Brackish Water.

In time of War, whole Navies may be relieved by this Engine, and opportunity given of making the greatest Discoveries imaginable.

It is further to be considered, that hitherto the richest and ablest bodied Sea-men have been averse from undertaking long Voyages, by reason of endangering their Healths and Lives, by making use of putrified Water, which Inconvenience is not now to be feared, there being such useful helps of Fresh Water by the use of this Engine, and possibly a
smaller

smaller number of Men may serve the use of Ships than do at present, by which much Charges will be saved to the Masters and Owners of Ships; and Merchants may Trade upon easier Terms.

A LETTER of Mr. BOYLES, to the Learned Doctor JOHN BEALE Fellow of the Royal Society, concerning *Fresh Water made out of Sea-Water*, printed at the Desire of the Patentees.

SIR,

TO give you a short Account (*suitable to the little time I have to do it in,*) of the Transaction, which I suppose must have given the rise to the mention made of my Name in the publik Gazzet; I must inform you, that one of my nearest Relations, (Captain Fitz-Gerald) and some other worthy Gentlemen, having acquainted His Majesty, that they had an Invention for making Sea-Water sweet and wholesom in great quantity, and with small Charge, and that I had examin'd, and did approve the Water so prepar'd; His Majesty was pleas'd, with very Gracious Expressions, to command me to attend Him, with a further and more particular Information. Having readily obey'd this Order, and been made acquainted with the Objections the King thought fit to make against the Practicableness of the Invention; which, (though a private man had urg'd them,) I should think the most judicious that have been fram'd against it, I humbly represented to Him, that I look'd upon this Invention as comprising two differing things; a Mechanical part, which related to the Engine it self and the use of it a Ship-board,

and a Physical part which concerns the Potableness and Wholesomeness of the Liquor. About the former of these I did not intend to clear the Difficulties, especially such strong ones, as His Majesty had propos'd; but left it to the Patentees to give Him Satisfaction, which they were in a readiness to offer. But as to the Wholesomeness of the prepared Water, I had made some Trials upon that Liquor, which gave me no just grounds of suspecting it to be unwholesome, but several Motives to believe it well conditioned, and of great use to Navigators, and not to them only. And having hereupon briefly acquainted His Majesty with the chief Trials I had made to examine this Sweetned Water, He was pleas'd to look upon them as satisfactory, and vouchsaf'd on that occasion to discourse as a Virtuoso of the Sea and Brackish Waters, and gave me some new, as well as instructive Observations about them: and in Conclusion, dismiss'd the Patentees with a Gracious Promise of His Royal Protection, and peculiar Favour.

To this short Narrative it now remains, that I briefly Subjoyn the chief things that perswaded me of the Salubrity of this Water, (whence may be justly and easily inferr'd, the Utilitie the Publick may receive by a cheap and easie way of preparing it.) First, then I considered that almost all the Rain-water that falls from the Clouds on the Main Ocean, and which (except perhaps in very few places in Torrid Climates) is unquestionably receiv'd as wholesome, must be afforded by the Sea, and consequently be but Seawater freed from its Salt (according to the Famous Motto, Redit Agmine dulci.) Next I found, as His Majesty Himself had done, that the Liquor was well tasted, and without any sensible Brackishness; and so some of it continued for between 4. or 5 Months in a large Chrystal Bottle, that I purposely kept unstopt, and for the most part in a South Window, where it neither did, nor probably in a long time, will putrifie, or so much as appear troubled or less transparent; during which time it was with Approbation tasted and smelled by several Learned Physicians of the Famous Colledge of London. Thirdly, I found it laver very well, which
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most Pump waters, and many others that have some little (though unperceived) common Salt in them, will not do. Fourthly, this Water will boile Pease tender, which amongst Seamen is one of the principal signs of good Water. Fifthly, in very good Ballances with an Instrument that I purposely caus'd to be made for the nice weighing of Liquors, I found this Water far less heavy than one would expect, for if it differ'd at all in weight from the like quantitie of undistilled Water, (I speak with an If, because it is far more difficult to be Exact in such nice Trials, than the Unpracticed will Imagine) the difference was not considerable being but 1 part in 400; and that difference is very small in Comparison of that which Navigators and Learned Authors relate to be observable in Natural Waters, all of them good and potable: I might tell you on this occasion; that the last Great Duke of Tuscany, who was an Eminent Virtuoso, and the Patron of the Celebrated Academy of the Lyncean Philosophers is affirmed among other prudent courses that he took for his Health, whereof he was very Solicitous to have constantly made use of Distill'd Water for his own Drinking. And I could add other things favourable enough to the Patentees Water, if Haste, and perhaps Discretion too, did not oblige me to leave them yet unmention'd, that I might now have time to say somewhat of the main thing of all that convinced me of the Saltness of the Water I speak of. I consider'd then, Sixthly, That the thing that was aim'd at by those Ingenious men, that at differing times, and in several Countries have attempted to make Sea water Sweet, and the thing that was requir'd by proposing Recompences, or otherwise to Encourage the Makers of such Attempts, was to Free the Sea-water from the Brackishness without any Noxious Additament: so that on all sides it was taken for granted, that the only thing that kept the Sea water from being safely Potable, was its Brackishness.

From which Reflection it was natural for me to infer a Conclusion very favourable to our prepar'd Water: For having long
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since written a short Discourse of the Saltness of the Sea; I had been industrious to devise ways of comparing Waters in point of Brackishness. And by these I found the Patentees Water to be more free from common Salt, than Waters that are usually drunk here in London, of which I remember I shew'd those Gentlemen an Experiment that surpriz'd as well as convinc'd them. And that which more satisfied me my self, was a Trial that I carefully made by a way which having mention'd, but not yet (for want of opportunity) disclos'd to His Majesty, the Respect I owe Him forbids me to impart without His Leave: On which account I hope you'll be content to be at present assur'd of these two things; One, that by this way of Trial, I found, (what possibly you will think strange;) that if there were in Water so much as one Grain of Salt, in above two Ounces of Water, I could readily discover it: The other, that even by this critical Examen, I could not detect so much as a thousandth part of Salt in our prepar'd Water; whereas I found by Trials purposely and carefully made, that our English Sea-water contain'd a 44th or 45th part of good dry Salt; or, which is all one, that 44 Pints, or near so many Pounds of Marine Water, would yield about one Pound of dry common Salt.

Thus, Sir, you have a short and Art-less Account, such as my haste will permit, and the Nature of the Subject requires, of my part in promoting this profitable Invention; to which I own my self a great well-wisher, not out of any private Interest (though that was obligingly proffer'd me by the Patentees,) but as I think the bringing into general use may prove a real Service to Mankind, upon the score of divers Utilities and Advantages, which yet (though I had leisure,) I should think very needless to enumerate to so discerning a person as Dr. B. to whom I shall therefore hasten to subscribe my self, &c.

An Affectionate Friend and Servant
R. BOTLE.
The

THe Gentlemen Concern'd in this Grant, are the Honorable *Robert Fitz Gerald*, Colonel *Oglethorp*, Mr. *Bridge-man*, Mr. *Thomas Maul*, and Mr. *Patrick Trant*, who intending the General Good as well as their Private Advantage in this Design, do intend as soon as these Papers be made publick, to agree with all such as are willing to deal with them for the Instruments and Ingredients; which concerning so nearly the Lives and Healths of men, shall be carefully made up under such sure and private marks, that it shall be very hard (if possible) to Counterfeit them.

If any Corporation, Body of People, or Private Persons, are willing to be concern'd herein, they may please to direct their Letters to any of the Patentees before mentioned, at *Gara-way's Coffee house* over against the *Royal-Exchange*, or at *Will's Coffee house* in *Bow-street* in *Covent Garden*, or to Mr. *John Pye* in *Brook-street* near *Holbourn*, who is the Person appointed by the Patentees to receive such Papers as are intended for them.

F I N I S.